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The chosen pedagogical, sociological and psychological aspects of a distance education

Abstract

In the paper, taking into account the empirical research of different authors, the chosen pedagogical, sociological as well as psychological aspects of the on-line teaching and learning processes in the university education are presented. It has been shown that the use of on-line education causes a significant influence on the didactic process in contemporary university. The typical features of the asynchronous learning networks have been discussed in the framework of cognitive psychology, based on the constructivist theory of learning by Jerome Bruner, cognitive constructivist theory by Jean Piaget and the social constructivist theory by Lev Vygotsky. Special attention has been focused on chosen critical variables for successful on-line learning and such groups of problems as: networked collaborative classrooms, community-building paradigm and types of networked interactions. The functions fulfilled by teachers in the asynchronous learning: organizational, social and intellectual, and their competences, have been described.

Key words: distance education, pedagogy, sociology and psychology in learning process, communication and information technologies, asynchronous learning networks, e-education, constructivism and cognitivism, on-line teaching and learning ,

Introduction

For Polish universities the on-line learning is quite a new educational problem that should be solved in our system of education. The main reasons for which we have to introduce in our educational system the e-learning (teleeducation, telematics, Asynchronous Learning Networks) as the alternative for the synchronous face-to-face education, are the following: - The needs for lifelong learning of participants of the creating information society as a result of altering their knowledge and skills (growing demand

for continually evolving skills). Only a small part of these people will find a "physical place" in post-graduate studies in a chosen university. The most of them will take part in short but intensive on-line courses, carried out by professional academic teachers, involved in that type of courses.

- Changing of vocational competences of people whose job will disappear in the near future and who will have to reach the new competences.
- The educational help for stationary and extramural students in their studies (in order to secure a higher efficiency and the same level of quality) with the use of computer-mediated asynchronous distance learning classes.

Additional reasons given for using the technology are: improvement of access to education and training for absolvents of post-gymnasia schools, improvement of the quality of learning, reduction in the cost of education and improving the cost-effectiveness of education.

In order to explain some chosen features of e-education I am going to synthesise in the paper those pedagogical, sociological as well as psychological aspects of the on-line learning, that one can find in numerous empirical papers: characteristics of networked collaborative (learner-centered) classrooms and a process of community-building in such classes, an on-line type interactions between students, pedagogical roles of a teacher and students in on-line higher education - all those in the framework of constructivist learning theory of Jerome Bruner, cognitive theory of Jean Piaget and social theory of Lev Vygotsky (for details see: Juszczyk, 2002, 2003).

1. Information and communication technologies in the post-modern university

We know that introducing the on-line teaching and learning to the university will cause a significant influence on the all-didactic process, including the traditional one. It means, that the university has to change its status from regional (local) to the global one, from a pre-industrial organization to the "post-modern" one. One can say, that before the introduction of the technology to the university teaching had taken place, it was not professionalized, in the sense of being based on skills resulting from research into and analysis of the teaching process. For instance, most university teaching has not been influenced to any extent by recent research into the cognitive psychology of learning, organizational management research, communications theories or research into human-machine interaction (Juszczyk, 1998, 2001), all of which have been critical for the development of post-modern knowledge-based organization. Therefore, from one side we have to restructure our university for technological change and from the second side, we should rethink its new -

social roles and functions. A great potential for such transformation is exhibited by the information and communication technologies. They are a source of different phenomena in educational process, which in order to be described, need the carrying out of theoretical as well as empirical research in the range of many disciplines. The results of such investigations should be explained in the framework of the cognitive and constructivist theories - see Fig. 1.

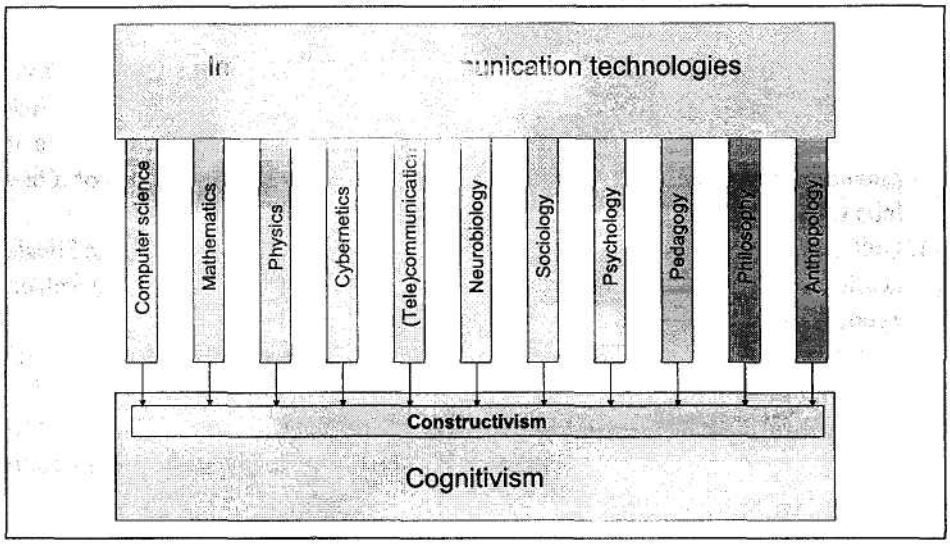

Fig. 1. The theoretical base of the information and communication technologies

In different universities the authors of asynchronous learning networks propose some models of change from traditional university to post-modern university. For instance A.W. Bates (1997) proposed twelve organizational strategies that concern:

1. A vision for teaching and learning, which describes what we would really like to see or to happen.
2. Funding re-allocation (often technology implementation is driven by external grant funding - our university applied a research project to Polish Committee for Scientific Research).
3. Strategies for inclusion - extend the technology-based teaching from a relatively small number of enthusiasts and early adopters to the main body of the teaching force.
4. Development of the technology infrastructure of a university.
5. People infrastructure that will make the physical infrastructure work.
6. Providing support for student access to computers in labs and in campus.

7. New teaching models and use of the latest results of the cognitive psychology research in the learning process.
8. Faculty agreements and training - showing how to use technology, basic understanding of the on-line teaching and learning process, understanding the different roles that technology can play in teaching and organization of teaching.
9. Project management with numerous elements that depend on the on-line directions of studies and students.
10. New organizational structures that encourage teaching units to be flexible, innovative and able to respond quickly to changes in subject matter, students needs and technology. In the case of my university, this role is played by the Centre for Information Technologies, which consists of a few labs of Multimedia Applications and two video-conference rooms.
11. Collaboration between universities and creation of consortia - all the Silesia academic institutions created consortium with the local administration agency/participation.
12. Systematic research and evaluation of the quality and effectiveness of the on-line teaching process.

After having concentrated on the proposals given by A.W. Bates I can conclude, that in University of Silesia in Katowice all the aspects of transition from classic to post-modern organization have been carefully discussed and then systematic ally introduced.

2. Asynchronous Learning Networks (ALNs) in the constructivist framework

The notion of asynchronous learning has been associated with distance education, in such embodiments as correspondence schools, in which the video-tapes, audio-tapes and written material (exercise books) were sent by postal or courier services. Sometimes lessons were supplemented by radio and television since such a dynamism helped students have a sense of "presence" from a distance.

The new and emerging computer and communication technologies now allow us to dispense with having to transmit educational information such as text, sound (audio), static and dynamic pictures (video-films); these forms of information may be recorded on CD-ROM or DVD plates and can be asynchronously transmitted to students. Also the World Wide Web constitutes a unified delivery mechanism for multimedia information content - video and audio can be digitised and compressed for on-line delivery; textual and

graphical material can also be converted into digital formats appropriate for WWW delivery.

Asynchronous Learning Networks (ALNs) model carries the promise of overcoming the barriers of physical isolation, distance and also those imposed by rigid time constraints (May ad as, 1997), as well as the capability of improving the efficiency (Arvan *et al,* 1998) without decreases in the quality of instruction and learning (Bourne, 1998).

We can assume that after having used the information and communication technologies a traditional on-campus learning will be enhanced in the sense that technology can be used to facilitate key mechanisms of effective learning, namely motivation, interaction between students and instructor and interaction among students themselves as well as collaboration in the learning enterprise.

The asynchronous learning networks have advantages for both distant and local (synchronous) education, but the extensive preparation and planning required for delivery of class material via multimedia asynchronous methods is always a major challenge.

The numerous researchers have pointed out the connections between the on-line medium and the constructivists' framework of teaching and learning (Sprague, Dede, 1999, pp. 16-17). They claim that the learning methodology is as important as the instructional technology employed (Becker, 1999). There also seems to be a connection between the pedagogical tendency of the teacher and his/her Internet use and valuation.

The constructivist theory of learning is based in general on three theoretical frameworks of Jerome Bruner, Jean Piaget and Lev Vygotski. According to J. Bruner, learning is an active process in which learners construct new ideas

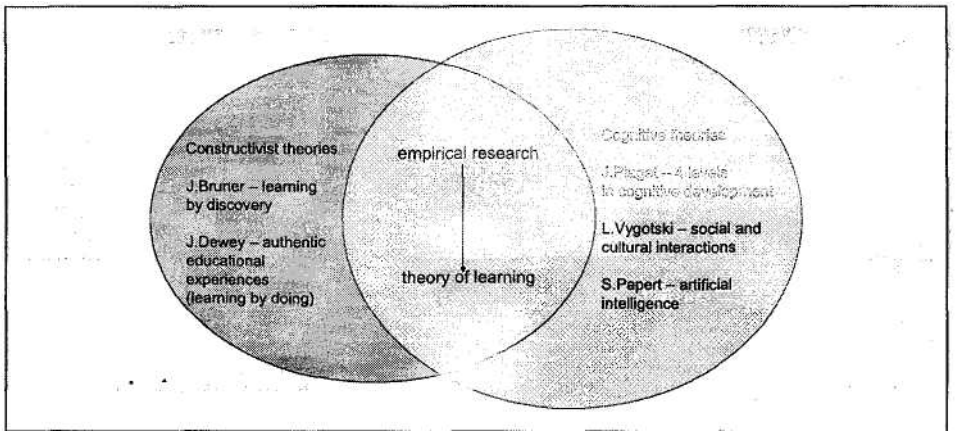

Fig. 2. Integration of constructivist and cognitive theories in order to construct the theory of learning

or concepts based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses and makes decisions based on cognitive structures. The cognitive structure (i.e. schema, mental models) introduces meaning and organization to experiences and allows the individual to "go beyond the information given" (B r u n e r, 1973) - cf. Fig. 2.

Cognitive constructivism is based on the works of Swiss developmental psychologist J. Piaget, who claims that the developing child builds in his head the cognitive structures - mental "maps", schemes, or networked concepts for understanding and responding to physical experiences within his or her environment. These schemas are changed, enlarged, and made more sophisticated through four complimentary processes (Piaget, 1977), which has been shown also alternatively on Fig. 3:

- Assimilation - associate new events with background knowledge and prior conceptions.
- Accommodation - change existing structures to new information.
- Equilibrium - balance internal understanding with external "reality" (e.g. others understanding).
- Disequilibrium - experience of a new invention without achieving a state of equilibrium.

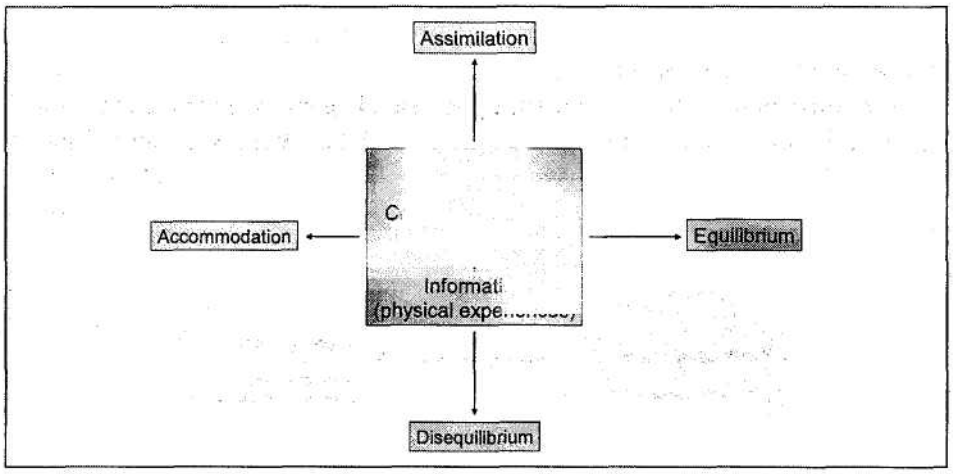

Fig. 3. Four levels of cognitive development in the framework of J. Piaget theory

Another cognitive psychologist, L. Vygotski, shared many of Piaget's assumptions about how children learn, but he put more emphasis on the social context of learning. The Vygotsky's social cognition learning model asserts that culture is the prime determinant of individual development.

Humans are the only species to have created culture, and every human child develops in the context of culture. Therefore, a child's learning development is affected to a bigger or lesser extent by the culture - including the culture of family environment - in which he or she is involved (Vygotsky, 1978). The process of perception the information from social, cultural and physical world, construction of mental maps with the use of cognitive processes, the processing of information by brain in order to activate the construction of meaning in the educational process on the basis of constructivist as well as cognitive theories have been shown on Fig. 4.

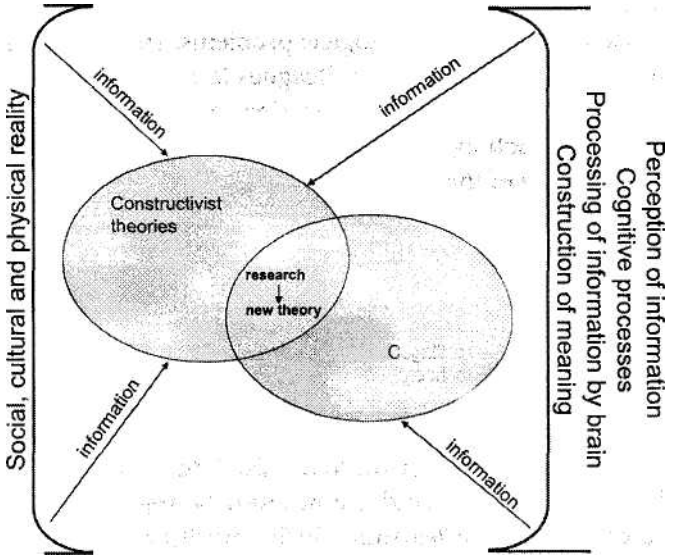

Fig. 4. The common region of the constructivist and cognitive theories in which we make the empirical research in order to know all phenomena taking place during the learning processes

In conclusion, constructivist environment starts with observations within a world of authentic artefacts rooted in authentic situations. Students, while accessing various materials, construct ongoing interpretations of their observations, and collaborate with their peers. Finally, students serve as coaches and teachers to each other to show the results of what they learned.

The thinking is a developmental process beginning from duality, moving to an understanding of multiple views, and finally acknowledging the context wherein the solution is given - weighing circumstantial evidence alongside factual data (Jaffe, 1998). This shift from pure reason and information from

determining "correct" answers to a consideration of self, situation, previous experience, and thinking strategies in creating "appropriate" answers is in essence the shift from objectivist to constructivist pedagogy. Posted messages, activities, and surveys cause this behavioural change - the data show that the ability to connect with others' knowledge and experiences, as well as their feedback, is essential.

3. Pedagogical, sociological and psychological problems of the on-line education

The process of the on-line teaching and learning exhibits many different pedagogical, sociological and psychological problems. They concern, in general, the physical absence of a teacher and colleagues in a group, feeling of solitude, initial troubles with a technology, motivation, self-discipline, the threat of alienation, learner satisfaction, and many others.

The physical absence of the teacher causes the need for other ways to create the motivational and authoritarian link between an instructor and a student. The anonymity of text dialogue puts more emphasis on explicit content rather than the physical attributes of the content (e.g. voice, gestures and sense of community). Therefore, the Instructor dialogue must be meaningful enough and relevant to students' needs to have an impact on their understanding. On-line instructors should also be more out-going, positive, and responsive to gain respect from their students.

In many cases the learners who were used to traditional face-to-face learning environments and who did not necessarily prefer ALNs had to adapt in the process of the on-line learning. Such transition from the traditional face-to-face classroom during the academic year to the on-line learning requires strong motivation, self-discipline, good-time management skills, and a comfortable learning environment including a stable Internet connection. According to the results of natural pedagogical experiment, conducted by X. Christine Wang and her co-workers (2001), the students' learning outcomes were closely related to their satisfaction with on-line communication, technical support, and the course design. Furthermore, prior on-line class experience affected learning outcomes. Additionally, prior experience with the technologies and a positive attitude toward technology were found to be important for successful on-line learning.

Learner satisfaction and learning outcomes are two commonly used indicators of course effectiveness, especially in the on-line learning studies (Webster, Hackley, 1997). Satisfaction relates to perceptions of being able to achieve success and feelings about achieved outcomes. Studies of learner

satisfaction are typically limited to one-dimensional post-class assessments of learners' perceptions. Learner satisfaction is often measured with "happy sheets" that ask the learners to rate how satisfied they were with their overall learning experience. However, it is also meaningful to explore the notion of satisfaction through a multidimensional analysis of a wide variety of critical variables in order to provide effective measures that guide improvements in instructional design for on-line programs. From this reason, some researchers have been trying to identify some critical variables in on-line learning. For instance OJ. Jegede *et al.* (1995) identified eight components of effective learning environments: interactivity, instructional support, task orientation, teacher support, negotiation, flexibility, technical support, and ergonomics. C. Gibson (1996) found that it is critical for distance students to be focused, better time managers, and able to work both independently and as a group members, depending on the delivery mode and location of the distance course. The chosen pedagogical aspects of the on-line education have been shown on Fig. 5.

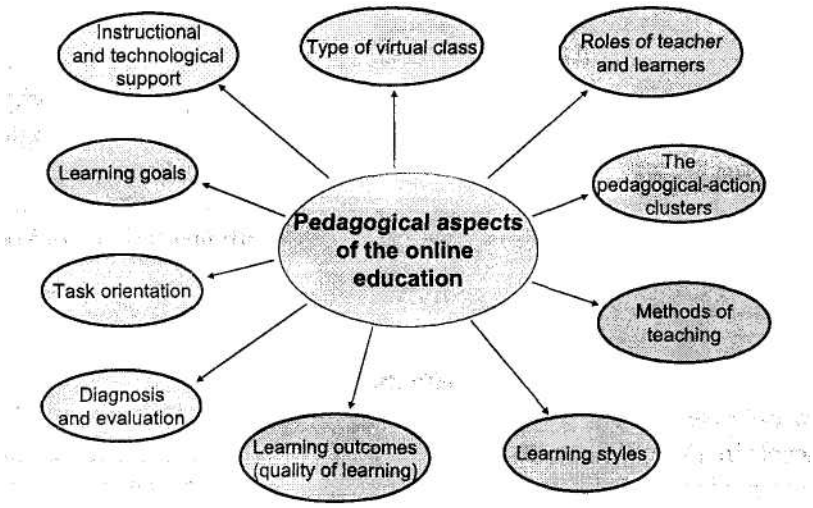

Fig. 5. The pedagogical aspects of the on-line education

On-line interaction and communication have been long regarded as important factors for successful on-line learning. Lack of direct communication is one of the most common frustrations in on-line learning.

Other studies suggest that important characteristics for on-line students include strong self-motivation, self-discipline, independence, and assertiveness (www.online.uillinois.edu/index.html). Another very important variable that directly influences the on-line learning outcomes is a prior learning experience,

in our case it denotes a level of familiarity with the technologies used in the on-line course, because they may become barriers to learning. The technology teaching and the on-line course could not take place at the same time. The new students should be at first familiar with technology and next be involved in the on-line course.

3.1. Community of the on-line learners

Students in asynchronous distance classes work at computers kilometres apart at varying times of the day and night. This feeling of being alone is overcome when students join together in a community of learners who support one another (Eastmond, 1995).

This problem has been described precisely by R.E. Brown (2001) in the framework of the community-building paradigm. According to the author, the paradigm should note the context in which community is formed, the conditions needed for formation of an on-line community, intervening conditions, which can positively or negatively affect its formation, and strategies for overcoming negative conditions and utilizing positive conditions. During on-line course students devote different amount of time for different types of activity. This situation has been characterised by R.E. Brown by the Time Triangle. The triangle for new students is placed at the base, and for the veteran students, who are familiarised with technology and teaching methods, is inverted - it is placed on the peak. The new students start usually with technology and on-line teaching. They spend a large part of their first few weeks getting comfortable with technology - this makes a base of a triangle. This situation is similar to the action of new students in the synchronous face-to-face learning. They spend much time on getting comfortable with the learning environment: laboratories, library, exercise and lecture rooms, getting to know academic teachers, etc. Next levels in a triangle denote understanding of the learner-centered teaching method (in general a pedagogy of the course), course content and familiarising themselves with the class content. A peak of the triangle denotes a process of community building - students get to know each other and participate in community-building activities. In comparison to the triangle of new students, the triangle for veteran students is inverted, what means, the veterans spend more of their time on the course content (essential information) and community-building activities.

The notions "new" and "veteran" students are relative. It is difficult to declare a specific amount of time, before a new student considers himself or herself a veteran student. Some students who successfully completed several classes can still feel like new students. These students did not find community or were

on the fringe of community. On the other hand, some students changed rapidly to achieve a satisfactory comfort level in all areas after having completed only one class - sometimes, after just a few weeks. These were students who identified themselves with a community. In general, the feeling of being a new student changes to feeling of being a veteran one when he or she becomes comfortable with certain technology, pedagogy, class content and classmates. Thus, the veteran status appears to be individual phenomenon based on personality, interaction and perhaps the intensity of the classes - certainly on participation and engagement.

Due to the problem of community building in the on-line learning is a very important variable, which influences directly the effectiveness of such mode of learning, I would like to direct the interested researcher to theoretical propositions that are the results of observations carried out during different pedagogical experiments (among others by E.R. Brown, 2001 - for details see S. Juszczyk, 2002). The chosen sociological aspects of the on-line education are shown on Fig. 6.

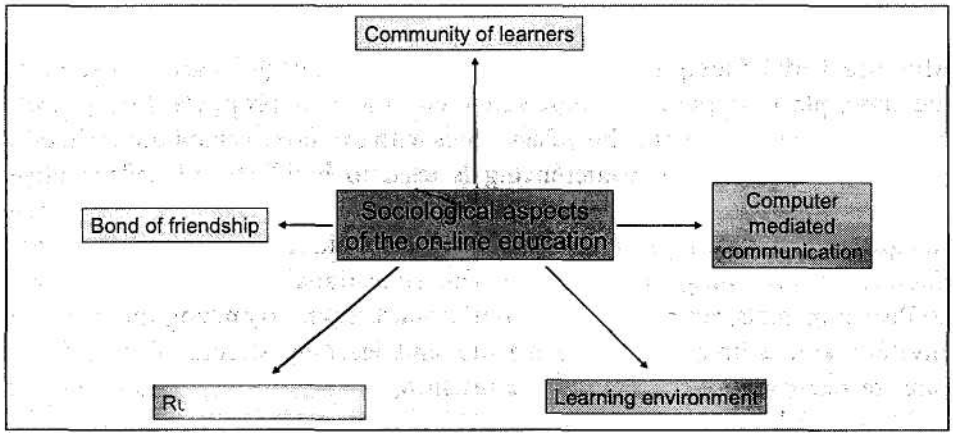

Fig. 6. The sociological aspects of the on-line education

In general the students utilizing computer-mediated communication need a longer period of time to create bonds of friendship, community or camaraderie than they might have in face-to-face associations, but one can find the necessary elements, which can help in improvement of this process. Some researchers found (see Brown, 2001, p. 32) that in on-line learning physical appearance, voice are not factors, which determine on-line friends or community members. Rather, judgements are based on textual input, particularly its content. Other factors are timeliness and supportiveness of input, as well as virtual personality, intelligence, commitment, and writing ability of the participant.

In many cases the satisfied students served as ambassadors for the on-line learning, recruiting others in their institution to enrol. In order to determine how community and satisfaction correlate, one has to do more empirical research.

The great potential that virtual classes have is that when a community forms, its members can easily keep in contact with one another through the Internet -the most interactive medium. Community does not have to end when the class or the program ends. Therefore, teachers in a department should consider ways in which one can continue two-way communication that facilitates community. He/she can readily keep in contact with students through a database of e-mail addresses, a listserv, or a web site. Thus, a community formed through the classes and the program, can be maintained not only for students' benefit (which may be personal, academic or both) but also for departmental and university purposes such as fundraising and networking (cf. Brown, 2001, p. 33).

3.2. Networked collaborative classrooms

L. Haras im *et al.* (1995) defined learning networks as "groups of people who use CMC (computer mediated communication) to learn together, at the time, place or pace that best suit them and is appropriate to the task". Networked classrooms are, thus, classrooms with extended capabilities, wherein asynchronous electronic conferencing is used to build shared collaborative spaces as a means to achieve set learning goals. For pedagogical action one can group the following actions taken by educators in mixed-mode networkers classrooms: providing orientation of the educational scenario, establishing the learning goals, structuring activities around tasks, organizing the learning environment, defining roles the teacher and learning should play, and the rules of participation. In the on-line teaching the pedagogical action aims at building collaborative classrooms through the implementation of networked technologies.

3.3. On-line learning interaction

In on-line learning environments the interactions among students are mediated, and there is an absence of non-verbal cues and text-on-screen is a very limited mode for what should be semantically rich exchanges.

According to CD. Curtis and M.J. Lawson (2001), one way to implement high level of interaction among students, and thereby to increase both the quality of students'learning experiences and the efficiency of delivery, is to implement collaborative learning. On-line interactions differ in quite

important ways from face-to-face contact, and this may reduce the extent of the communication that occurs. Much on-line conversation occurs asynchronously, with substantial delays in receiving a replay. This may have both advantages and disadvantages for the participants. However, the students are able to contact each other outside the group forum (conference or discussion forum - board) by personal e-mail, file transfer, fax, or by telephone and even by private face-to-face meetings. The last types of interactions are caused by the fact that on-line, text-only interactions can lead to misunderstandings due to limited information capacity of the medium compared to relative richness of vocal and non-verbal interactions of face-to-face learning environments. Sometimes the students can organize synchronous chat sessions to supplement other forms of communication, find them as a positive support of previous form of interactions. The chosen psychological aspects of the on-line education are presented on Fig. 7.

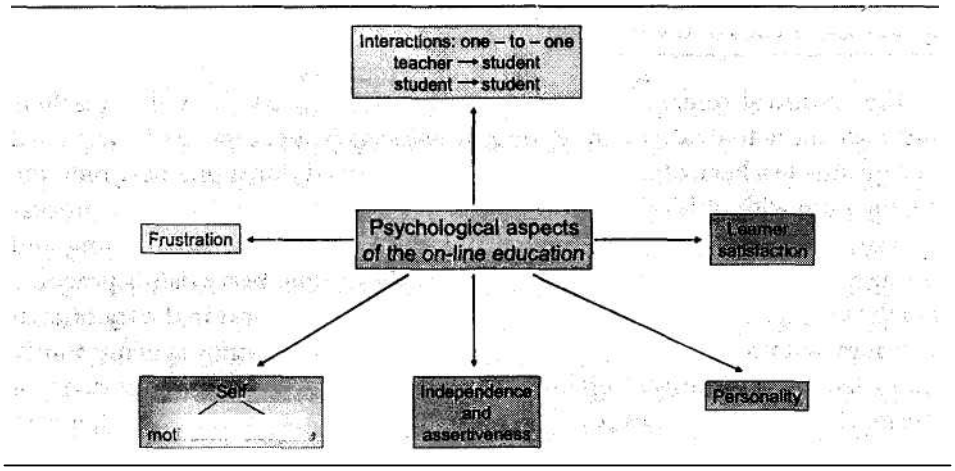

Fig. 7. The psychological aspects of the on-line education

In on-campus study students have access to interactions with academic teachers in seminars and in individual consultations. In on-line teaching such an interaction is available, though it is mediated through some form of computer and information technology - CIT. The one-to-many interaction typical lectures and seminars that comprises most of the student-teacher interactions is often replaced by one-to-one interaction via CIT (what is important especially for those students who do not seek individual contacts with their teachers). However, for the lecturer this interaction occurs at the expense of efficiency because mediated one-to-one interactions, such as e-mail interchanges, are easily initiated by students and can be very time-consuming.

The most common type of interaction in the on-line courses is an asynchronous interaction. There is an important distinction between realtime and asynchronous forms of interaction. The current forms of real-time interaction are limited by the capacity of communication links, e.g. voice communication. E-mail or forum discussions depend on web-based applications that enable participants to create and edit messages stored in an area accessible to group members which organizes messages into "threads" of conversation. During learning in an on-line environment students' interactions are restricted to text or picture messages on screen. This medium of interaction may exhibit the degree of collaboration that is possible by limiting the extent and depth of interactions. However, since this on-line interaction is much more demanding than most students would normally experience in a distance-learning course, they may perceive that the experience enhances the interactions available to them - see CD. Curtis and M.J. Laws on (2001).

3.4. Competencies of the on-line teachers

The empirical research done in American universities show that teachers must have the actual experience of on-line learning before they can be expected to be on-line teachers, otherwise, they simply map traditional practices onto the new medium with little of the transformation necessary in the teaching process (Campos *et al,* 2001, pp. 36-37). Without proper pedagogical training and on-line experience, teachers will continue to replicate their best existing practices onto the on-line medium. This divergence between what works in the traditional classroom within a stable cohort of learners communicating synchronously face-to-face is qualitatively different from an on-line asynchronous style of learning and teaching. From this reason the teachers should participate in distance educators listserve posts, and by following various publications, websites, journals, and conference proceedings they can construct the content and structure of the on-line lectures and exercises.

One can say that a good teacher creates a desire to participate, to become a community member. Community creates an opportunity to learn from each other, to network with each other, and to gain support now and in the future. It is the teacher's role to inform students about community's potential benefits, in order to make the students want to build a real community. Both e-mail addresses, phone, fax numbers and also discussions in virtual cafeterias as well as face-to-face meetings will help build the community.

The teacher is an on-line moderator and has three fundamental roles: organizational, social, and intellectual (Gold,2001,p.47).The organizational role involves setting the agenda for discussion. Essentially, the teacher must lay

the groundwork for the discussion to begin. The moderators main social role is the creation of a friendly environment for students interacting with each other, for instance by posting to them an "Introduction" several days before the class begins. The introduction can include an identification paragraph, followed by professional interests, personal interests, ideas, and some words of advice. Good moderators often send out welcome messages, use a personal tone, and provide their feedback with specific examples and references. Another important social role is that of modelling good Net and intellectual behaviour for students. The best teachers often show them how to be better students, and in turn, teachers themselves. Finally, the moderator must become the facilitator of the students' understanding. The teacher should focus on crucial points of discussions, ask questions, estimate student responses, synthesize and summarize points, and help take advantage of the readings and class resources. Many published results of empirical research on the on-line teaching show that the activity of teachers moves in a direction of constructivist and cognitivism orientation, by evaluation of the quantity and quality of interaction between learners and their skills in the range of intermediate communication. Following this change, an increase of the knowledge of teachers on the teaching process is observed (Wang ef a/.,2001,pp. 1-21; Smerdon *et al,* 2000).

5. Conclusions

In the conclusion I can say that in the University of Silesia in Katowice we have adopted chosen aspects of the successful models of a distance education from some universities in USA and some Western Europe universities. But the difference existing between the universities in Poland and in USA and European Union countries in the infrastructure, computer local and metropolitan networks and the experience of academic teachers and students in active participation in on-line studies call for detailed both the empirical and theoretical exploration of the similar problems in Poland.

In the framework of social science methodology (e.g. by the use of natural pedagogical experiment, survey, interview, conversation, tests, analysis of documents and products of human action and other empirical methods of research), on the base of the on-line learning of constructivist learning theory by Jerome Bruner (1973), cognitive theory by Jean Piaget (1997) and social theory by Lev Vygotsky (1978), we plan to analyse above mentioned pedagogical, social and psychological aspects. As a result, we should discuss the methods of diagnosis and evaluation of the students' didactical activities. The range of such empirical studies is shown in Fig. 2 as a common part of constructivist as well as cognitive theories. Different types of research done in this area allow us

to develop both theories and as a result build a new, homogeneous cognitive theory of information that will be the base for explanation of the process of learning. In such a way, the information and communication technologies should be recognized as the careers of culture, with a significant part of it - the medial culture. New technologies will become a creator of cultural values, when used to find, collect, register and process the information, they will create a new quality of culture. From the humanistic point of view, the new technologies will be treated as an element of the system of values, laws, rules, exchange, needs and possibilities that they create for their users. Paying attention to the axiological aspects will result in effectivity of the future education, and the cultural aspects will help us in interpretation of the observed phenomena and processes. The new technologies influence significantly the distribution of different skills and knowledge among students.

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